

NFPA 705
Recommended Practice for a
Field Flame Test for Textiles and Films
2003 Edition

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This edition of NFPA 705, *Recommended Practice for a Field Flame Test for Textiles and Films*, was prepared by the Technical Committee on Fire Tests and acted on by NFPA at its May Association Technical Meeting held May 18–21, 2003, in Dallas, TX. It was issued by the Standards Council on July 18, 2003, with an effective date of August 7, 2003, and supersedes all previous editions.

This edition of NFPA 705 was approved as an American National Standard on July 18, 2003.

Origin and Development of NFPA 705

The 1993 edition of NFPA 705 was a complete revision of what was Chapter 10, Field Test: Match Flame Test, in the 1989 edition of NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films*. Due to the lack of data demonstrating a relationship between the field match test and NFPA 701 small- or large-scale testing, the Committee determined it would be appropriate to create this document so as not to perpetuate any application of a correlation. The field match test does not incorporate the more rigorous laboratory testing methods incorporated into the small- and large-scale testing such as conditioning of specimen, reproducibility, and repeatability. The revisions to NFPA 705 incorporated an increase in safety precautions during the testing procedure, type of ignition source, and removal of sample prior to testing.

The 1997 edition of NFPA 705 was a reconfirmation of the earlier edition.

For the 2003 edition, the chapter layout of NFPA 705 was reorganized to meet the NFPA *Manual of Style*.

Technical Committee on Fire Tests

William E. Fitch, Chair
Omega Point Laboratories Inc., TX [RT]

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Patty K. Adair, American Textile Manufacturers Institute Inc., DC [M]

Jesse J. Beitel, Hughes Associates, Inc., MD [SE]

April L. Berkol, Starwood Hotels & Resorts Worldwide, Inc., NY [U]
Rep. American Hotel & Lodging Association

Robert G. Bill, Jr., FM Global, MA [I]

John A. Blair, The Dupont Company, DE [M]
Rep. Society of the Plastics Industry Inc.

Gordon H. Damant, Inter-City Testing & Consulting Corporation of California, CA [SE]

Thomas W. Fritz, Armstrong World Industries, Inc., PA [M]

James R. Griffith, Southwest Research Institute, TX [RT]

Gordon E. Hartzell, Hartzell Consulting, Inc., TX [SE]

Marcelo M. Hirschler, GBH International, CA [SE]

Alfred J. Hogan, Reedy Creek Improvement District, FL [E]
Rep. International Fire Marshals Association

William E. Koffel, Koffel Associates, Inc., MD [SE]

James R. Lawson, U.S. National Institute of Standards and Technology, MD [RT]

Rodney A. McPhee, Canadian Wood Council, Canada, [M]

William S. Metes, Underwriters Laboratories Inc., IL [RT]

Frederick W. Mowrer, University of Maryland, MD [SE]

Nigel R. Stamp, Intertek Testing Services NA, Inc., WI [RT]

Phil M. Stricklen, American Fibers and Yarns Company, GA [M]

Kuma Sumathipala, American Forest & Paper Association, DC [M]

T. Hugh Talley, Hugh Talley Company, TN [M]
Rep. Upholstered Furniture Action Council

Rick Thornberry, The Code Consortium, Inc., CA [SE]

William A. Webb, Performance Technology Consulting, Ltd., IL [SE]

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Robert A. Wessel, Gypsum Association, DC [M]

Robert J. Wills, American Iron and Steel Institute, AL [M]

Peter J. Willse, GE Global Asset Protection Services, CT [I]

Alternates

Delbert F. Boring, Jr., American Iron and Steel Institute, OH [M]

(Alt. to R. J. Wills)

Sam W. Francis, American Forest & Paper Association, PA [M]

(Alt. to K. Sumathipala)

Richard G. Gann, Ph.D., U.S. National Institute of Standards and Technology, MD [RT]

(Alt. to J. R. Lawson)

Peter L. Hunsberger, Armstrong World Industries, Inc., PA [M]

(Alt. to T. W. Fritz)

James K. Lathrop, Koffel Associates, Inc., CT [SE]

(Alt. to W. E. Koffel)

James A. Milke, University of Maryland, MD [SE]

(Alt. to F. W. Mowrer)

Arthur J. Parker, Hughes Associates, Inc., MD [SE]

(Alt. to J. J. Beitel)

David K. Tanaka, FM Global, MA [I]

(Alt. to R. G. Bill, Jr.)

William A. Thornberg, GE Global Asset Protection Services, CT [I]

(Alt. to P. J. Willse)

James J. Urban, Underwriters Laboratories Inc., IL [RT]

(Alt. to W. S. Metes)

Joe Ziolkowski, American Furniture Manufacturers Association, NC [M]

(Alt. to T. H. Talley)

Nonvoting

Robert H. Barker, American Fiber Manufacturers Association, DC [M]

(Alt. to T. L. Jilg)

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Tod L. Jilg, Hoechst Celanese Corporation, NC [M]
Rep. American Fiber Manufacturers Association

Rohit Khanna, U.S. Consumer Product Safety Commission, MD [C]

Herman H. Spaeth, Novato, CA
(Member Emeritus)

Steven E. Younis, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on fire testing procedures, for reviewing existing fire test standards and recommending appropriate action to NFPA, for recommending the application of and advising on the interpretation of acceptable test standards for fire problems of concern to NFPA technical committees and members, and for acting in a liaison capacity between NFPA and the committees of other organizations writing fire test standards. This Committee does not cover fire tests that are used to evaluate extinguishing agents, devices, or systems.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1 Scope.

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1.1.1 This recommended practice provides guidance to enforcement officials for the field application of an open flame to textiles and films that have been in use in the field or for which reliable laboratory data are not available.

1.1.2 There is no known correlation between this recommended practice and NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, or full-scale fire behavior.

1.2 Purpose.

1.2.1 The purpose of this recommended practice is to provide authorities having jurisdiction with a field means of determining the tendency of textiles and films to sustain burning subsequent to the application of a relatively small open flame.

1.2.2 The methods described herein and the results do not correlate with any known test method, and factors relating to reproducibility and correlation have not been determined; therefore, they should not be relied upon when more definitive test data are available.

1.3 Application.

1.3.1 These recommendations apply to materials used in the interior of buildings, for protective outdoor coverings such as tarpaulins and tents, and for plastic films (with or without reinforcing or backing) used for decorative or other purposes inside buildings or as temporary or permanent enclosures for buildings under construction.

1.3.1.1* The field test method can be useful to regulatory officials as an indicator of whether a material being used or installed burns very easily or can be flame resistant as indicated by the following:

- (1) Cessation of burning when the igniting flame is removed
- (2) Failure to burn at all
- (3) Continuing to burn nonaggressively after the igniting flame is removed

1.3.1.2 The field test method has utility only when the authority having jurisdiction has no reliable data and, therefore, is forced to rely solely on the field test findings.

1.3.1.3 There are only two types of materials for which the field test method can be deemed to provide foolproof and totally adequate results: those made entirely of noncombustible inorganic material and those that ignite and burn readily on exposure to a small flame. For example, with only limited experience, an inspector will have no difficulty in identifying an all-mineral fiber fabric by employing a small open flame, and no other procedure is necessary. The only effect a small fire exposure has on a mineral fiber fabric is to burn off the surface coloring, if any, leaving the threads themselves virtually undamaged. This result is not obtained with any other type of decorative fabric and, therefore, is readily recognized. At the other extreme, if a material ignites and burns readily from the application of a small open flame from a source such as a kitchen match, showing no semblance of flame resistance, no other procedure is necessary, since the material obviously is not acceptable.

1.3.1.4 Between these two extremes, the field test method has a limited and a varying

degree of reliability. Within this large group, which comprises the great majority of materials the enforcement official is likely to encounter in the field, the most reliable results are obtained in the testing of cellulose-based materials (cotton, rayon, and paper) that are flame retardant treated with the common inorganic salt formulations. These materials retain their shape reasonably during testing, and the results are not greatly affected by differences in sample size or severity of fire exposure. However, the least-reliable results are obtained with chemically treated fabrics of synthetic fibers or flexible plastic films and laminates. These materials are subject to a variety of physical changes when exposed to fire, such as shrinking, curling, melting, elongating, and similar distortions, making the examination of small samples quite difficult and the results ambiguous. Furthermore, some of these thermoplastic materials are apt to appear flame resistant with small flame exposures but ignite and burn fiercely with longer exposures to larger ignition sources.

1.3.2 Materials applied to surfaces of buildings or backing materials as interior finishes in buildings should be tested and classified in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*.

Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, 2000 edition.

NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, 1999 edition.

2.3 Other Publications. (Reserved)

Chapter 3 Definitions

3.1 General.

The definitions contained in this chapter apply to the terms used in this recommended practice. Where terms are not included, common usage of the terms applies.

3.2 NFPA Official Definitions.

3.2.1* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.2 Recommended Practice. A document that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word “should” to indicate recommendations in the body of the text.

3.2.3 Should. Indicates a recommendation or that which is advised but not required.

3.2.4 Standard. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

3.3.1 Film. A flat section of a thermoplastic resin, a regenerated cellulose derivative, or other material that is extremely thin in comparison to its length and breadth and has a nominal maximum thickness of 0.25 mm (0.01 in.).

3.3.2 Kitchen Match. A piece of wood with a combustible mixture at its tip that bursts into flame through friction, with an approximate length of 61.9 mm ($2\frac{7}{16}$ in.) and an approximate weight of 29 g (1 oz) per hundred.

3.3.3 Textile. A material made of natural or man-made fibers and used for the manufacture of items such as curtains, clothing, and furniture fittings.

Chapter 4 Procedure

4.1* Materials.

4.1.1 Specimens should be samples removed from the existing material.

4.1.2 Specimens should be dry and should be a minimum of 12.7 mm × 101.6 mm ($\frac{1}{2}$ in. × 4 in.).

4.2 Open Flame.

The fire exposure should be from a common wood kitchen match or source with equivalent flame properties.

4.2.1 The flame should be applied for 12 seconds.

4.3* Method.

4.3.1 The test should be performed in a draft-free and safe location free of other

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combustibles.

4.3.2 The sample should be suspended (preferably by means of a spring clip, tongs, or similar device) with the long axis vertical, the flame supplied to the center of the bottom edge, and the bottom edge 12.7 mm (½ in.) above the bottom of the flame.

4.3.3 After 12 seconds of exposure, the match is to be removed gently away from the sample.

4.4 Requirements.

During the exposure, flaming should not spread over the complete length of the sample or, in the case of larger samples, in excess of 101.6 mm (4 in.) from the bottom of the sample.

4.4.1 There should be not more than 2 seconds of afterflame.

4.4.2 Materials that break or drip flaming particles should be rejected if the materials continue to burn after they reach the floor.

Chapter 5 Summary

5.1 Limitations.

The deficiencies and limitations of the field test method can lead to misleading or erroneous results, and the error can be in both directions. It is quite possible to have a too-small sample show several seconds of afterflaming, causing the material to be rejected. It is equally possible for improper or inadequate field procedures to incorrectly indicate satisfactory flame resistance. This can result in dangerous errors.

5.2 Precautions.

Field procedures are useful, but they must be used with good judgment and their limitations should be recognized. Field tests should not be relied on as the sole means for ensuring adequate flame resistance of decorative materials. They are, however, useful in augmenting a comprehensive regulatory program.

Annex A Explanatory Material

Annex A is not a part of the recommendations of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.3.1.1 By far, the greatest benefit can be derived from the field test method when the inspector has had the opportunity to practice and experiment on a variety of decorative materials and particularly to make comparisons between the results of laboratory tests performed in accordance with NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, and the less-precise field test method. Experience is the best teacher, and it is strongly recommended that inspectors who may be involved in this

activity familiarize themselves with a wide variety of treated and inherently flame-resistant fabrics and the typical behavior of those fabrics under a variety of test conditions. With this background, the inspector possesses a greater capability for properly interpreting field test results.

A.3.2.1 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.4.1 A difficult and controversial question concerns the minimum number of specimens that should be tested. The answer can be dictated by a number of factors. A good general rule is the more specimens, the better; but, in all cases, the inspector should exercise good judgment. The variety of circumstances that can be encountered can be illustrated by some specific examples:

- (1) A dance in a school gymnasium, decorated by students with a profusion of paper banners, crepe paper streamers, figures made of pieces of tissue paper stuffed in chicken-wire molds, hay and straw, painted fabrics, dry palm fronds, and similar products, all alleged to be flame resistant: In this situation, the inspector has neither reason nor excuse to be inhibited in taking samples for tests. The materials are inexpensive and are unlikely to be reused. Taking samples for tests will cause little if any change to the decorative effect.
- (2) A large assembly tent made of supposedly treated canvas but with no identifying marks and no confirming evidence of such treatment: The life hazard is acute, tent canvas can readily be patched, and, therefore, the situation warrants nothing less than sufficient samples from all sections of canvas for the inspector to be satisfied that the quality and uniformity of the treatment are acceptable.
- (3) A nightclub with very expensive draperies known to be adequately flame retardant-treated when installed two years previously: The only way to be certain that the quality of flame resistance remains acceptable is to take a sample, but in the interest of maintaining good public relations, the inspector should be diplomatic and persuasive. Usually, a place can be found where a small but adequate sample can be extracted without causing any visible damage. Often this is the most the inspector can expect to get.

A.4.3 There can be complications of a technical nature. Decorative fabrics sometimes are installed overhead, in or near a horizontal position. Some plastic films or fabrics woven of thermoplastic synthetic fibers will successfully resist continued burning in the normal vertical position of test, but will exhibit continued burning if exposed in a horizontal position. Fabrics

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or films installed horizontally may be a serious threat to safety in a fire situation, and, therefore, the inspector is justified in testing the material in a horizontal position.

A somewhat similar problem can exist with some of the new and increasingly popular decorative fabrics with one or more types of fibers in the threads along the length (warp) and different fibers in the threads along the width (fill). This can result in a different burning behavior in the two directions of the fabric. In some fabrics where a flame-retardant treatment has been applied, tests for flame resistance in one direction may be acceptable, but the fabric could show continued burning in the other direction. Where visual examination of the fabric indicates this condition might exist, the inspector should test samples cut with the long dimension paralleling both the length and width of the fabric.

Annex B Informational References

B.1 Referenced Publications.

The following documents or portions thereof are referenced within this recommended practice for informational purposes only and are thus not part of the recommendations of this document unless also listed in Chapter 2.

B.1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, 1999 edition.

B.1.2 Other Publications. (Reserved)

B.2 Informational References. (Reserved)

B.3 References for Extracts. (Reserved)

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